

FIG. 1

1 2 3

M13K07 →
phagemid →

1 2 3

FIG. 2A FIG. 2B

FIG. 2A

FIG. 2B

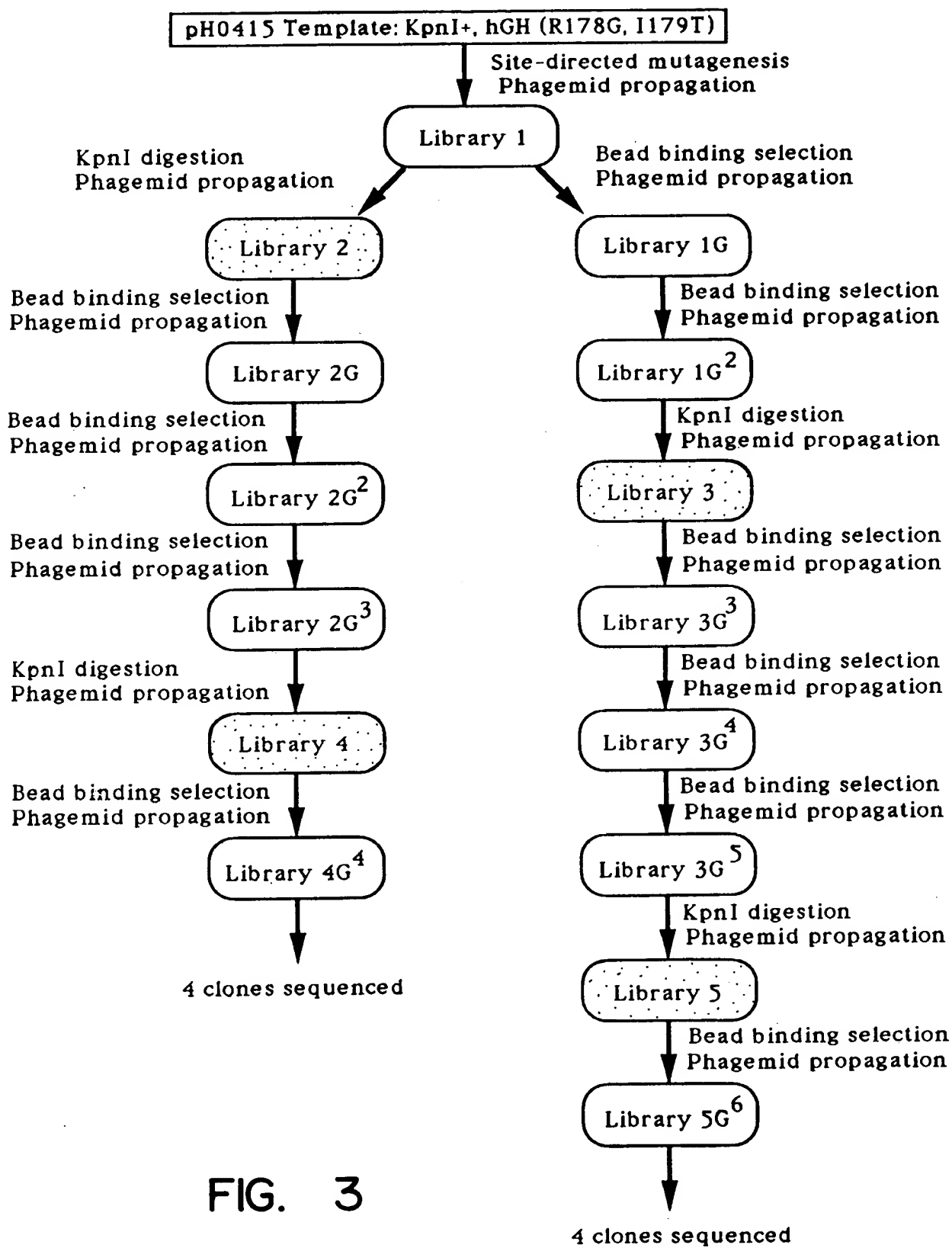


FIG. 3

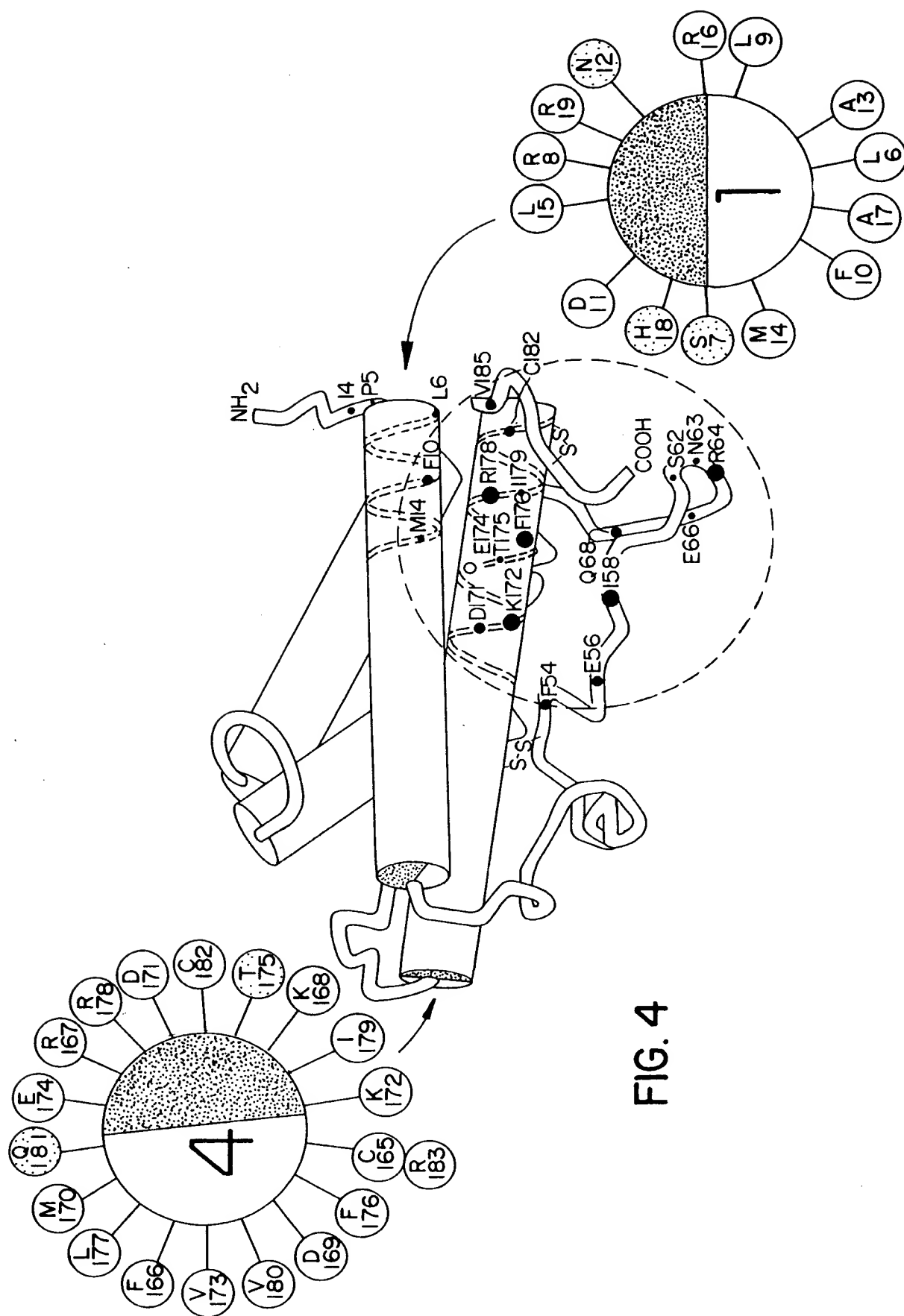


FIG. 4

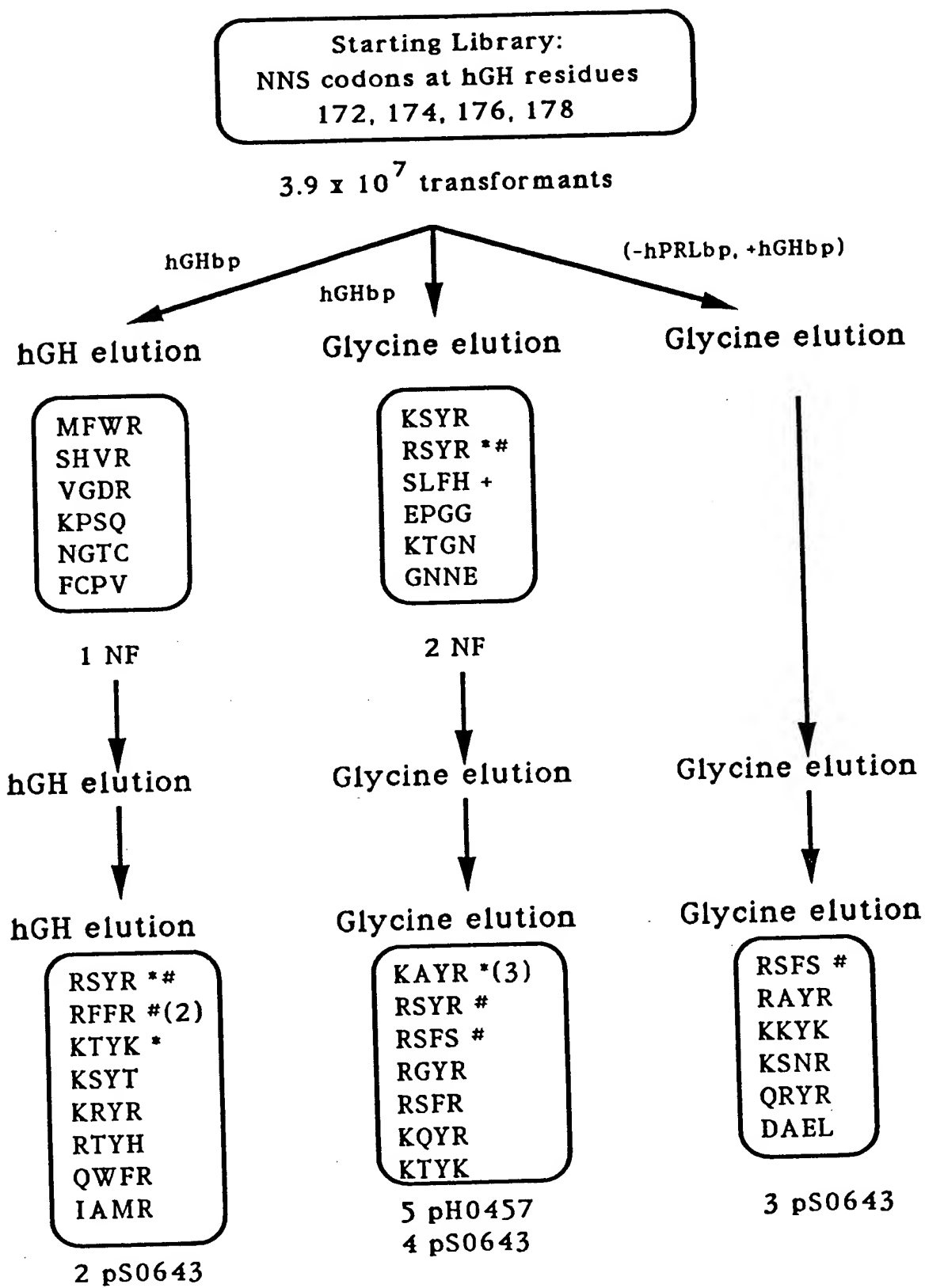
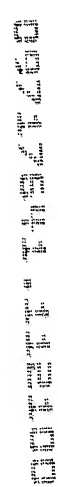


FIG. 5

[illegible][illegible][illegible]

Starting Library:
NNS codons at hGH residues
172, 174, 176, 178

3.9×10^7 transformants

hPRLbp

hGH elution

TKRA
RSLR
NATF
GLHK
RTAH

3 NF

hGH elution

hGH elution

hGH elution

ANHQ *(4)
TLDT *(3) +
RIYL ++

+= D171V
++=D171A

Glycine elution

LPLL
LLSN
LNYD
LGPR
RSCL
AMGA
SRNN

1 NF

Glycine elution

Glycine elution

+=I179M

SARS
HMRS +
QEK
LEFT
SSST
DKPL

2 NF

FIG. 7

Starting Library:
NNS codons at hGH residues
172, 174, 176, 178

3.9×10^7 transformants



Glycine elution



Glycine elution



KELR +	+= L163P
KDIN	
REGK	
RNGP	
CNGK	
SKLS	
QRPG ++	++= K168R
LLLV	

1 NF

FIG. 8

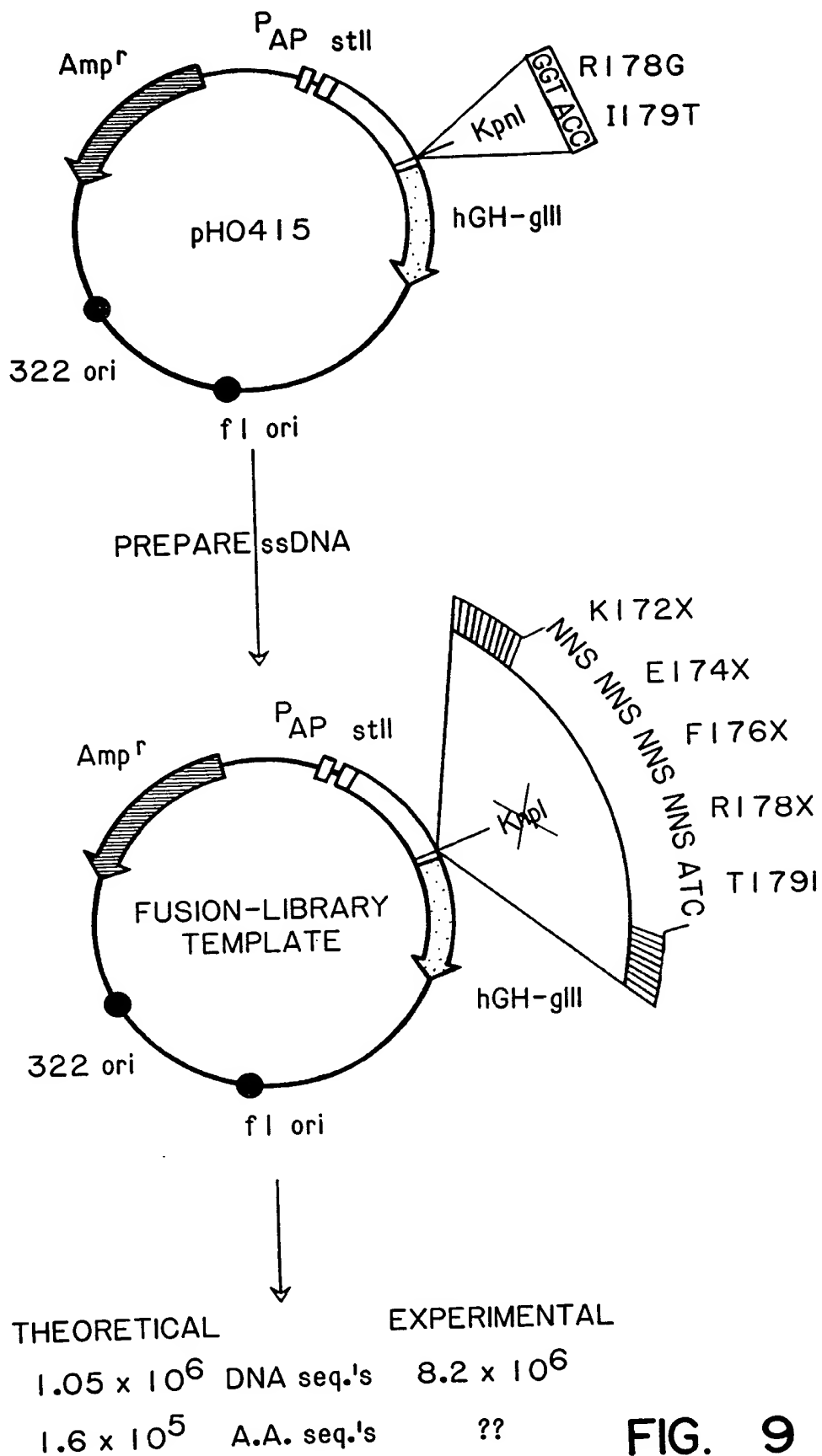


FIG. 9

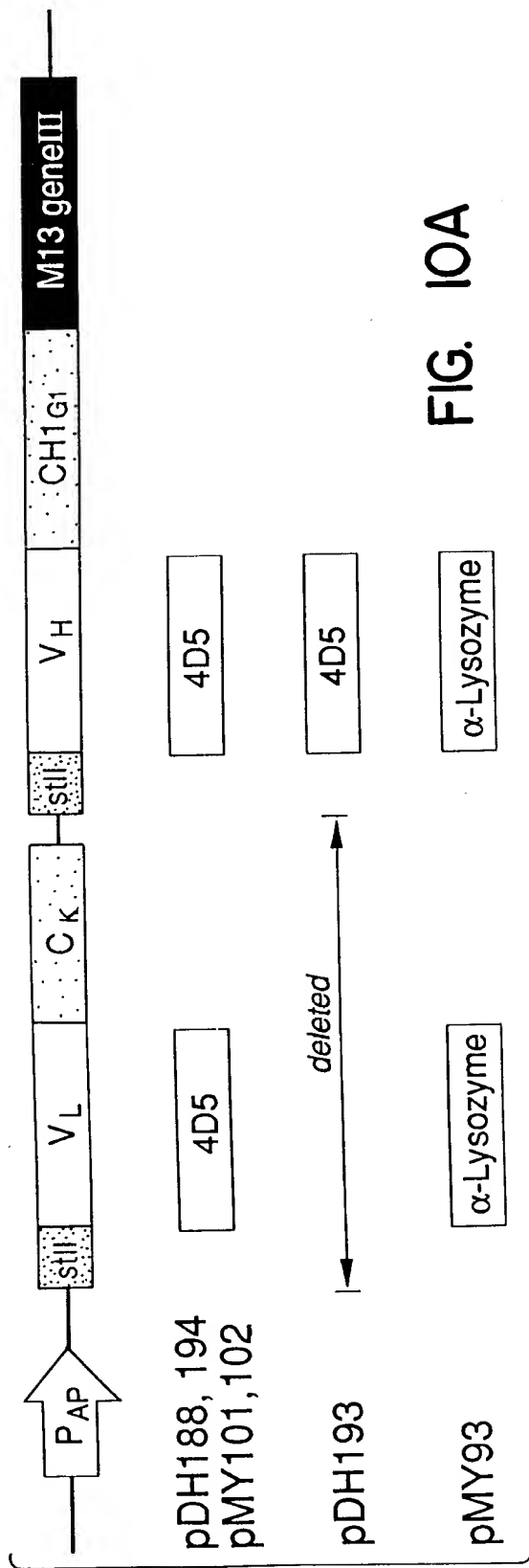


FIG. 10A

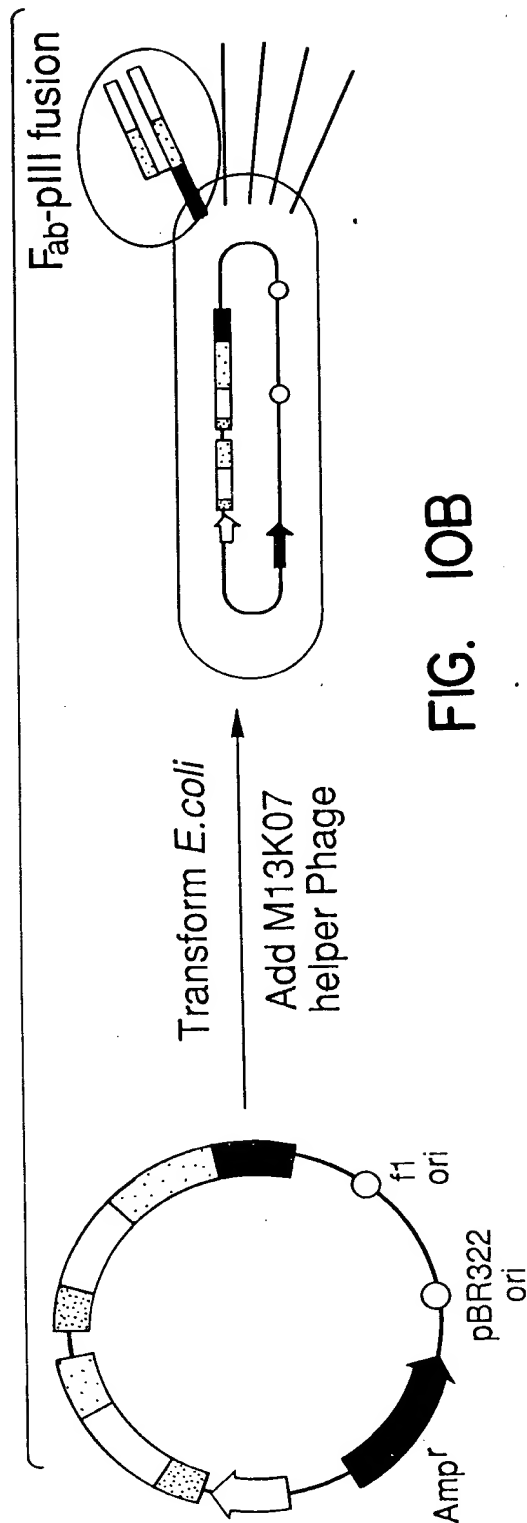


FIG. 10B

ATG AAA AAG AAT ATC GCA TTT CTT GCA TCT ATG 36	
Met Lys Lys Asn Ile Ala Phe Leu Ala Ser Met	10
	5
	1
TTC GTT TTT TCT ATT GCT ACA AAC GCG TAC GCT GAT ATC 75	
Phe Val Phe Ser Ile Ala Thr Asn Ala Tyr Ala Asp Ile	25
	20
	15
CAG ATG ACC CAG TCC CCG AGC TCC CTG TCC GCC TCT GTG 114	
Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val	35
	30
GGC GAT AGG GTC ACC ATC ACC TGC CGT GCC AGT CAG GAT 153	
Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp	50
	45
	40
GTG AAT ACT GCT GTA GCC TGG TAT CAA CAG AAA CCA GGA 192	
Val Asn Thr Ala Val Ala Trp Tyr Gln Gln Lys Pro Gly	60
	55
AAA GCT CCG AAA CTA CTG ATT TAC TCG GCA TCC TTC CTC 231	
Lys Ala Pro Lys Leu Leu Ile Tyr Ser Ala Ser Phe Leu	75
	70
	65
TAC TCT GGA GTC CCT TCT CGC TTC TCT GGA TCC AGA TCT 270	
Tyr Ser Gly Val Pro Ser Arg Phe Ser Gly Ser Arg Ser	85
	80

FIG. 11A

Genetic Code

GGG ACG GAT TTC ACT CTG ACC ATC AGC AGT CTG CAG CCG 309
Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
95 100

GAA GAC TTC GCA ACT TAT TAC TGT CAG CAA CAT TAT ACT 348
Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Thr
105 110 115

ACT CCT CCC ACG TTC GGA CAG GGT ACC AAG GTG GAG ATC 387
Thr Pro Pro Thr Phe Gly Gln Gly Thr Lys Val Glu Ile
120 125

AAA CGA ACT GTG GCT GCA CCA TCT GTC TTC ATC TTC CCG 426
Lys Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro
130 135 140

CCA TCT GAT GAG CAG TTG AAA TCT GGA ACT GCC TCT GTT 465
Pro Ser Asp Glu Gln Leu Lys Ser Ser Gly Thr Ala Ser Val
145 150 155

GTG TGC CTG CTG AAT AAC TTC TAT CCC AGA GAG GCC AAA 504
Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys
160 165

GTA CAG TGG AAG GTG GAT AAC GCC CTC CAA TCG GGT AAC 543
Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn
170 175 180

FIG. 11B

TCC CAG GAG AGT GTC ACA GAG CAG GAC AGC AAG GAC AGC 582
Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser 190
185

ACC TAC AGC CTC AGC AGC ACC CTG ACG CTG AGC AAA GCA 621
Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala
195 200 205

GAC TAC GAG AAA CAC AAA GTC TAC GCC TGC GAA GTC ACC 660
Asp Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr 220

CAT	CAG	GGC	CTG	AGC	TCG	CCC	GTC	ACA	AAG	AGC	TTC	AAC	699
His	Gln	Gly	Leu	Ser	Ser	Pro	Val	Thr	Lys	Ser	Phe	Asn	
				225					230				

AGG	GGA	GAG	TGT	TAAGCTGAT	CCTCTACGCC	GGACGCATCG	740
Arg	Gly	Glu	Cys				
	235		237				

TGGCCCTAGT ACGCAAGTTC ACGTAAAG GGTATCTAGA GTTGAGGTG 790

ATTTT	ATG	AAA	AAG	AAT	ATC	GCA	TTT	CTT	CTT	GCA	TCT	828
	Met	Lys	Lys	Asn	Ile	Ala	Phe	Leu	Leu	Ala	Ser	
	238		240					245				

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COPIES

ATG TTC GTT TTT TCT ATT GCT ACA AAC GCG TAC GCT GAG 867
Met Phe Val Phe Ser Ile Ala Thr Asn Ala Tyr Ala Glu
250 255 260

GTT CAG CTG GTG GAG TCT GGC GGT GGC CTG GTG CAG CCA 906
Val Gln Leu Val Glu Ser Gly Gly Leu Val Gln Pro
265 270

GGG GGC TCA CTC CGT TTG TCC TGT GCA GCT TCT GGC TTC 945
Gly Gly Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe
275 280 285

AAC ATT AAA GAC ACC TAT ATA CAC TGG GTG CGT CAG GCC 984
Asn Ile Lys Asp Thr Tyr Ile His Trp Val Arg Gln Ala
290 295 300

CCG GGT AAG GGC CTG GAA TGG GTT GCA AGG ATT TAT CCT 1023
Pro Gly Lys Gly Leu Glu Trp Val Ala Arg Ile Tyr Pro
305 310

ACG AAT GGT TAT ACT AGA TAT GCC GAT AGC GTC AAG GGC 1062
Thr Asn Gly Tyr Thr Arg Tyr Ala Asp Ser Val Lys Gly
315 320 325

CGT TTC ACT ATA AGC GCA GAC ACA TCC AAA AAC ACA GCC 1101
Arg Phe Thr Ile Ser Ala Asp Thr Ser Lys Asn Thr Ala
330 335

FIG. IID

Genetic Code

TAC CTG CAG ATG AAC AGC CTG CGT GCT GAG GAC ACT GCC 1140
 Tyr Leu Gln Met Asn Ser 345
 340

GTC TAT TAT TGT TCT AGA TGG GGA GGG GAC GGC TTC TAT 1179
 Val Tyr Tyr Cys Ser Arg Trp Gly Gly Asp Gly Phe Tyr
 355 360 365

GCT ATG GAC TAC TGG GGT CAA GGA ACC CTG GTC ACC GTC 1218
 Ala Met Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr Val
 370 375

TCC TCG GCC TCC ACC AAG GGC CCA TCG GTC TTC CCC CTG 1257
 Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu
 380 385 390

GCA CCC TCC TCC AAG AGC ACC TCT GGG GGC ACA GCG GCC 1296
 Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala
 395 400

CTG GGC TGC CTG GTC AAG GAC TAC TTC CCC GAA CCG GTG 1335
 Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val
 405 410 415

ACG GTG TCG TGG AAC TCA GGC GCC CTG ACC AGC GGC GTG 1374
 Thr Val Ser Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val
 420 425 430

FIG. 11E

CAC ACC TTC CCG GCT GTC CTA CAG TCC TCA GGA CTC TAC	1413
His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr	
435	
TCC CTC AGC AGC GTG GTG ACT GTG CCC TCT AGC AGC TTG	1452
Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu	
445	
GGC ACC CAG ACC TAC ATC TGC AAC GTG AAT CAC AAG CCC	1491
Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro	
460	
AGC AAC ACC AAG GTG GAC AAG AAA GTT GAG CCC AAA TCT	1530
Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser	
470	
TGT GAC AAA ACT CAC ACA GGG CCC TTC GTT TGT GAA TAT	1569
Cys Asp Lys Thr His Thr Gly Pro Phe Val Cys Glu Tyr	
485	
CAA GGC CAA TCG TCT GAC CTG CCT CAA CCT GTC AAT	1608
Gln Gly Gln Ser Ser Asp Leu Pro Gln Pro Val Asn	
500	
GCT GGC GGC GGC TCT GGT GGT TCT GGT GGC GGC TCT	164
Ala Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser	
510	
515	
520	

[illegible]

GGC TCT GAG GGA GGC GGT TCC GGT GGT GGC TCT GGT TCC 1725
Gly Ser Glu Gly Gly Gly Gly Gly Gly Ser Gly Ser
535 540 545

GGT	GAT	TTT	GAT	TAT	GAA	AAG	ATG	GCA	AAC	GCT	AAT	AAG	1764
Gly	Asp	Phe	Asp	Tyr	Glu	Lys	Met	Ala	Asn	Ala	Asn	Lys	
		550					555					560	

GGG GCT ATG ACC GAA AAT GCC GAT GAA AAC GCG CTA CAG 1803
Gly Ala Met Thr Glu Asn Ala Asp Glu Asn Ala Leu Gln 570

TCT	GAC	GCT	AAA	GGC	AAA	CTT	GAT	TCT	GTC	GCT	ACT	GAT	1842
Ser	Asp	Ala	Lys	Gly	Lys	Leu	Asp	Ser	Val	Ala	Thr	Asp	
	575					580					585		

TAC	GGT	GCT	GCT	ATC	GAT	GGT	TTC	ATT	GGT	GAC	GTT	TCC	1881
Tyr	Gly	Ala	Ala	Ile	Asp	Gly	Phe	Ile	Gly	Asp	Val	Ser	
			590					595					

GGC	CTT	GCT	AAT	GGT	AAT	GGT	GCT	ACT	GGT	GAT	TTT	GCT	1920
Gly	Leu	Ala	Asn	Gly	Asn	Gly	Ala	Thr	Gly	Asp	Phe	Ala	
600					605					610			

FIG. 11G

CGTCTT 14341.600

GGC TCT AAT TCC CAA ATG GCT CAA GTC GGT GAC GGT GAT 1959
 Gly Ser Asn Ser Gln Met Ala Gln Val Gly Asp Gly Asp 625
 615 620

AAT TCA CCT TTA ATG AAT AAT TTC CGT CAA TAT TTA CCT 1998
 Asn Ser Pro Leu Met Asn Asn Phe Arg Gln Tyr Leu Pro 635
 630

TCC CTC CCT CAA TCG GTT GAA TGT CGC CCT TTT GTC TTT 2037
 Ser Leu Pro Pro Gln Ser Val Glu Cys Arg Pro Phe Val Phe 640
 645

AGC GCT GGT AAA CCA TAT GAA TTT TCT ATT GAT TGT GAC 2076
 Ser Ala Gly Lys Pro Tyr Glu Phe Ser Ile Asp Cys Asp 660
 655

AAA ATA AAC TTA TTC CGT GGT GTC TTT GCG TTT CTT TTA 2115
 Lys Ile Asn Leu Phe Arg Gly Val Phe Ala Phe Leu Leu 675
 665 670

TAT GTT GCC ACC TTT ATG TAT GTA TTT TCT ACG TTT GCT 2154
 Tyr Val Ala Thr Phe Met Tyr Val Phe Ser Thr Phe Ala 685
 680

AAC ATA CTG CGT AAT AAG GAG TCT 2178
 Asn Ile Leu Arg Asn Lys Glu Ser 698
 695

FIG. 1 IH

00443260

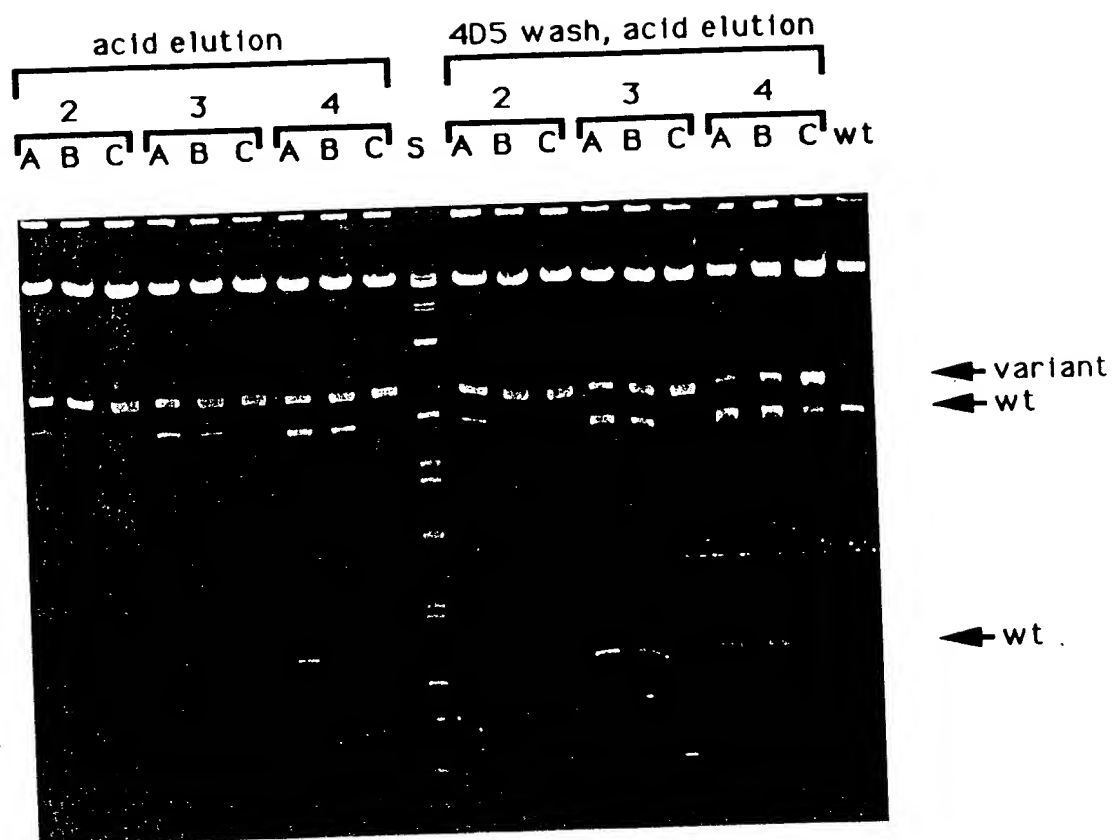


FIG. 12

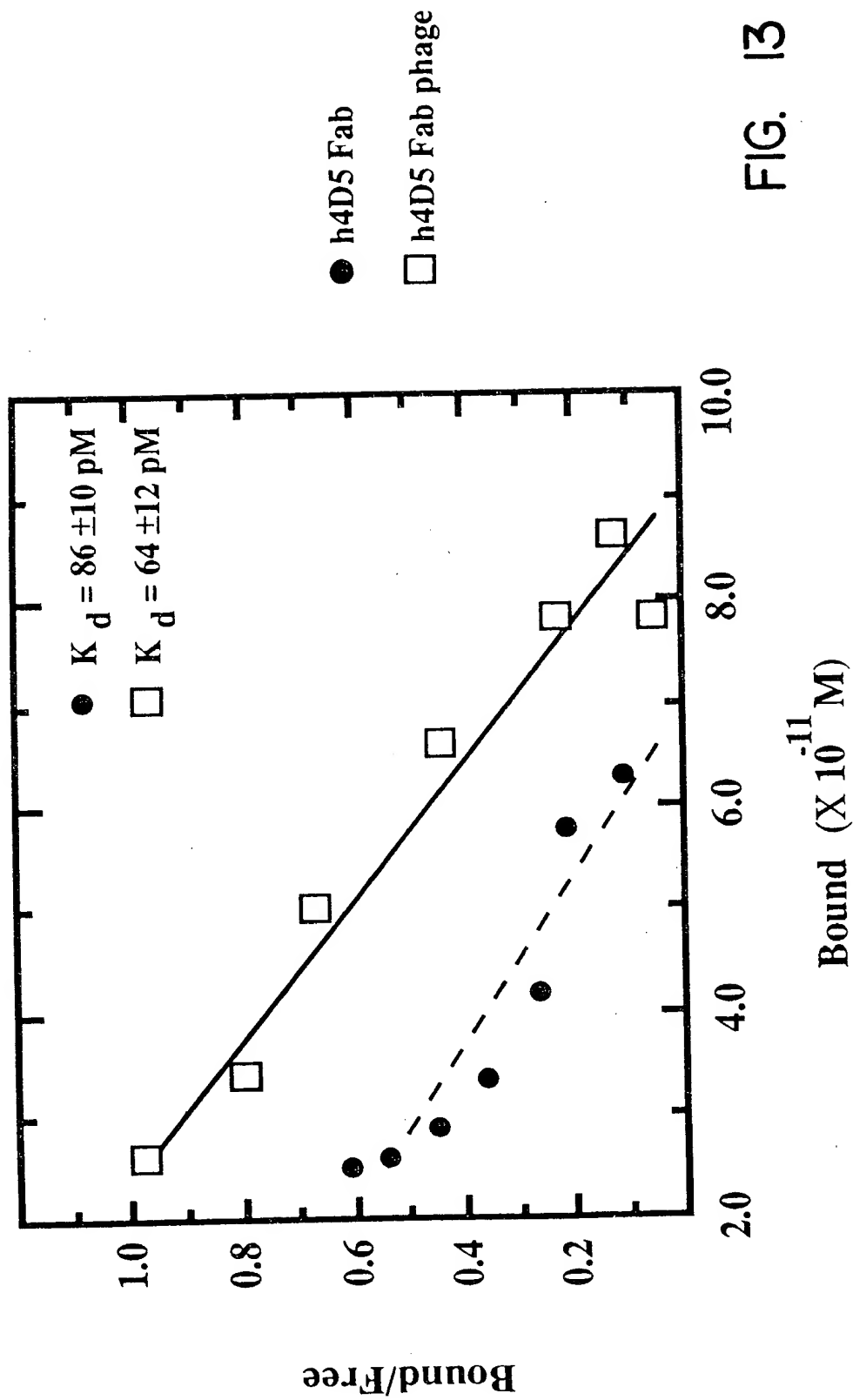


FIG. 13